



Discussion of Changed and Unforeseen Circumstances

CHANGED AND UNFORESEEN CIRCUMSTANCES

I. THE “NO SURPRISES RULE”

The No Surprises rule generally provides that, as long as the HCP is being properly implemented, the federal government will not require additional land or money from the permittee in the event of unforeseen circumstances, and that any additional measures to mitigate reasonably foreseeable changed circumstances will be limited to those changed circumstances specifically identified in the HCP (and only to the extent of the mitigation specified in the Plan).

The Rule has the following two major components:

(1) Changed Circumstances: if additional conservation and mitigation measures are deemed necessary to respond to changes in circumstances that were provided for in the HCP, the landowner will be expected to implement the measures specified in the HCP, but only those measures and no others; and

(2) Unforeseen Circumstances: the Services will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources, even upon a finding of unforeseen circumstances, unless the landowner consents. Upon a finding of unforeseen circumstances, the Services are limited to modifications within conserved habitat areas and the HCP’s operating conservation program. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources.

Changed circumstances are those changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by the landowner and the Services at the time of preparation of the Plan and that can be planned for.

Unforeseen circumstances are those changes in circumstances which are not “changed circumstances,” i.e., those changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by the landowner and the Services at the time of the HCP development and that result in a substantial and adverse change in the status of a species covered by the HCP. The Services bear the burden of demonstrating that unforeseen circumstances exist, using the best available scientific and commercial data available, and considering certain specific factors.

Consistent with the Rule and long-established agency practice, the HCP Implementation Agreement includes provisions restricting the authority of the agencies to require additional mitigation measures from PALCO to provide for the conservation of the Covered Species.

II. DYNAMICS OF COASTAL PACIFIC FORESTS - FIRE, WIND, FLOOD, LANDSLIDE AND EARTHQUAKE CHANGED CIRCUMSTANCES AND UNFORESEEN CIRCUMSTANCES

INTRODUCTION

The forest ecosystems on PALCO's lands present the context within which this plan is prepared. These ecosystems are by no means static; they are dynamic, regularly impacted by various physical processes that shape and reshape the habitat for affected resident, transient and migratory species which occupy those lands during some or all of their natural history. Indeed, the many aquatic, avian and terrestrial species for whose conservation this plan is crafted evolved in close association with this ever-changing mosaic of biological elements. However, circumstances may be much changed today on industrial timberland from original natural conditions, and the rate at which changes now occur from land management may be accelerated over evolutionary processes.

Briefly, the physical processes which affect the biodiversity and landscape ecology of PALCO lands are usually of low intensity, and they are generally quite confined in geographic extent and significance of impact. Nonetheless, historically in some forest environments, physical processes have on rare occasions been of "catastrophic" intensity, from the standpoint of impact to individual plants and animals, and these can affect large areas of the forested landscape. The very term "catastrophe" means a sudden, unexpected disaster, for which there can be no preparation. The term, intensity, periodicity and scale of such "catastrophic" events remain stochastic, impossible to predict, and they are inevitably differentially applied across the landscape.

That physical processes *can* significantly alter forest habitat has been a substantive consideration in the development of this Plan. Below, we briefly summarize why we believe such possibilities are sufficiently remote as to require no further or additional land management restrictions beyond that described below as the appropriate response or range of responses to a particular changed circumstance.

The human perspective of processes acting on the physical and biological environment is generally narrow and limited, given the temporal and spatial context of the occurrence and frequency of such events. But it is important to understand the dynamics of the relationship between the physical processes at work in the forest environment and their effects upon forest habitat. This understanding is enhanced by observing both the present relationship and the physical record left in location geology, tree rings, soil profiles, relic tree distributions, etc.

The marbled murrelet, the coho salmon, northern spotted owl, and other forest and aquatic

species embraced within this habitat conservation plan were no doubt present in North America prior to the arrival of the first Native Americans, and their populations were doubtless affected by changing climatic conditions, just as were the first Native Americans in North America (see Hoffeecker, et al. 1993 for perspective). Indeed, the coastal areas of southern Alaska and British Columbia (and much of Washington), where marbled mm-relets are now most abundant, were under ice, and forests were absent, during the last glacial maxima (see interesting presentation in Pielou 1991). Obviously, marbled murrelets and other forest related species subsequently successfully colonized the forests of these areas, and since then, they have persisted in the presence of forest processes, including the effects of fire and wind, flood, earthquake and landslides, on forest ecosystems and structure.

Presented here is a short review of literature on fires, windstorms, and other physical processes, and their effects on the coastal forests of the Pacific Northwest. In addition, our observations of forest structure relative to these processes on the lands of PL are presented. This review is not exhaustive of the primary technical literature, although such references are cited, but in the main relies on technical review articles. Unfortunately, the literature on this subject is derived from few locations in the region, and summary statements are necessarily general in nature. The vast environmental heterogeneity of the forests of the region compounds the difficulty encountered in any attempt to predict the likelihood or scope of these kinds of events, or the potential for the effects and impacts they may pose.

The relationship between fire, flood and other physical processes in the structure and composition of forest communities has been appreciated for a considerable period of time. In general, there is a growing awareness of the role and importance of fire, and to a lesser degree windstorms and other more localized disturbance agents, in the maintenance of animal communities and habitat within the North American landscape, including the Pacific Northwest coastal forests (see e.g., Franklin and Dymess 1973; Brown 1985; Henderson, et al. 1989; Morrison & Swanson 1990; Agee 1991).

It is generally appreciated that fire events, especially catastrophic events, effect immediate changes in vegetation structure and contained animal communities (see e.g., Quinn 1990 and contained references). Such changes are also known for forest areas (Huff, et al. 1985). There is little doubt that large, catastrophic fires, and windstorms and other significant environmental events have, just as did the eruption of Mt. Saint Helens, the potential to impact members of local animal communities through changes in supporting habitats. However, it is also quite apparent that the populations of many species have survived in the presence of periodic fires, floods, earthquakes and windstorms within their occupied ranges and habitats, as they occur in present forests. More likely than not most species will continue to survive with populations of sufficient size, distribution and connectivity to successfully avoid concerns for genetic isolation and stochastic demographic events.

A. THE ROLE AND EFFECTS OF FIRE

Fire can be a significant agent in determining forest structure in the Pacific Northwest but its effects, intensity, and frequency vary considerably (Agee and Edmonds 1992). Although it is possible to generalize that fire is an important element in forest ecology, it is not possible to specify the impacts of fire on any given area. This is so because invariably, fires are not uniformly distributed through time (Morrison and Swanson 1990), the areas affected often differ markedly (Henderson, et al. 1989), and the intensity and scale vary considerably (Henderson, et al. 1989; Morrison and Swanson 1990). Regional examples of the role of fire over the past several hundred to few thousand years demonstrate this variability,

The Olympic Peninsula of Washington, the site of the Olympic National Park and Olympic National Forest, is well known for the large variation in rainfall and plant communities. The Olympic Peninsula also provides important habitat for a variety of at-risk fish and wildlife species. Much of the forest of the Olympic Peninsula is theoretically within the known daily flight range of nesting Marbled Murrelets, for example. Generally, the western lowlands of the Olympic Peninsula, an area of significant rainfall, are within the Sitka Spruce Zone, while the eastern and northeastern lowlands, areas of lower rainfall, are within the Western Hemlock Zone (Franklin and Dymess 1973; Henderson et al. 1989).

Fire is relatively unimportant as a process in the Sitka Spruce forest, where a fire return rate (i.e., average interval between fires) of 900 years is observed. There were few fires in the last 700 years and these were generally in dryer southern aspect areas, and they were relatively small in area (Huff et al. 1985). In contrast, in the Western Hemlock forest fire is a significant process in the ecosystem; most areas in this forest type have burned several times in the last 700 years. Yet, even in this area, the fire return rate, for large intense fires, is 234 years. The last catastrophic fire in this area of landscape proportions only burned about 2,700 acres (Henderson et al. 1989).

The relatively infrequent occurrence of significant fire events in the wet lowland Sitka Spruce Zone on the Olympic Peninsula (Henderson et al. 1989) is likely representative of the role of fire in this zone from southern Alaska to northern California, where it blends into the coast redwood forest, a special type of the Sitka Spruce Zone (Franklin and Dyrness 1973). This is a community of long-living tree species where reproduction may be limited to openings in the forest from windthrow or other mortality of trees. As the cited authors note, in the Olympic Rain Forest reproduction is from downed logs and seedlings, and there are few places where fire has allowed Douglas-fir to establish.

Along the Pacific Coast in Washington and Oregon, the Western Hemlock Zone lies inland of the Sitka Spruce Zone and is usually drier than the last. As shown, fires are more common and more intense within the Western Hemlock Zone. However, within this zone, there is a gradient in the intensity, scale, and frequency of fires (Agee and Edmonds 1992), and perhaps all of this zone has burned over the past several hundred years. Douglas-fir is often dominant or the sole dominant in rural stands and Douglas-fir dominates large forest areas (Franklin and Dymess

1973). Along much of the Oregon coast, fire intervals vary from 90 to 150 years, to 500 years inland at the crest of the coast range. Yet, there are many examples of 400 to 600 year old old-growth stands.

Fire plays a role in determining the structure of coast redwood forests. Indeed, Franklin and Dymess (1973) state “Almost all the large [coast redwood trees] bear massive scars suggesting it may be a seral species dependent upon fire for reproduction.” Others (Agee and Edmonds 1992) have noted that south of Eureka fires of moderate intensity were fairly frequent in occurrence. They report fire intervals of 50 to 500 years in the coast redwood region. Other authors have reported low intensity fires in the redwood zone may have return intervals as low as 12-20 years. However, stand replacing fires are apparently very rare events.

Site-specific susceptibilities to fire are evident in the redwood forests of Northern California. For example, compared to alluvial flood plain areas, fire is likely to be more common in areas of topographic relief within the coast redwood forests (e.g., ridgetops). On PALCO lands, although there are specific site or stand peculiarities, fire scars are commonly evidenced on large coast redwoods and Douglas-firs, indicating both the widespread occurrence of fire and the particular resistance of these mature trees to consumption by fire. However, in some old-growth stands on PALCO's lands distinct age classes are evident. These observations suggest the presence of a relatively stable old-growth coast redwood forest subject to fires of moderate intensity, but occurring on a scale of centuries. Again, the implication is that fire, although present, is not leading to stand destruction and replacement except on a scale of centuries.

In light of this analysis, it is not reasonably foreseeable that stand replacing fires will occur on PALCO's lands during the life of this conservation plan. Thus it is unnecessary to provide for new, different or additional mitigation or conservation, including management restrictions or reserve configurations based on any speculation that such effects could occur.

Fire Changed Circumstances

Wildfires which burn 500 to 2,500 acres in any one hydrologic unit which result in the consumption of the understory vegetation in the RMZs of the Class I and Class II streams within the fire boundary are a changed circumstance. (Smaller fires, i.e., fires which burn less than 500 acres in any one hydrologic unit, are considered part of the ordinary forest ecology, and are already mitigated by the existing Operating Conservation Program.) The effects of such changed circumstance fires are already largely addressed by the terrestrial conservation strategy in this plan. The largest remaining stands of old-growth redwood forest, for example, are conserved under this plan throughout its effective term, thus mitigating the effects of small to moderate fires on marbled murrelet habitat. All of the MMCA's and the Headwaters Reserve include significant buffers which provide an additional level of protection against fire originating from human activities in the old growth areas. Effects on spotted owls and other late seral forest species are mitigated by the provisions in the HCP which insure a significant amount of widely-

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distributed late seral conditions throughout the HCP term.

However, in order to mitigate the impact of such changed circumstance fires on aquatic species, PALCO and the appropriate federal and state agencies will conduct an expedited watershed analysis on the hydrologic unit impacted by any changed circumstance fire.

The analysis will be commenced as soon as the requisite personnel from PALCO and the federal and state agencies required for the analysis can be made available. If a watershed analysis has been performed previously for such watershed, then the affected area will be revisited. If the watershed has not been previously analyzed as part of the contemplated watershed analysis process established by this Plan, then the watershed will be made a priority for analysis.

If multiple fire changed circumstances occur sufficiently close to each other in time such that the response will be significantly delayed due to lack of available personnel, PALCO will meet and confer with the applicable agencies in order to prioritize the analyses which need to be done. The purpose of prioritizing will be to consider those watersheds which are most at risk of further impacts first.

The outcome of the watershed analyses will be the development of appropriate measures to minimize to the extent practicable the occurrence of sediment inputs that could accumulate with the fire event and exacerbate negative impacts to the streams and aquatic covered species. The measures developed will be implemented. Ongoing Covered Activities may continue to utilize the existing operating measures until the new measures resulting from the analysis are developed. However, as the agencies deem necessary, in consultation with PALCO, measures will be promptly implemented to minimize adverse effects prior to completion of the watershed analysis to the extent feasible.

Fire Unforeseen Circumstances

A fire Unforeseen Circumstance is any fire which covers more than 2,500 acres.

B. THE ROLE AND EFFECTS OF WIND

Windstorms can be a major process in the coastal forests of the Pacific Northwest (Agee and Edmonds 1992; Henderson et al. 1989). Once away from the coast, windstorms are not as regionally important, although limited areas of blown-down and damage along stand edges does occur.

In the Sitka Spruce Zone, windthrow may be the primary disturbance factor acting on the forest, as opposed to fire in drier, more inland areas (Agee and Edmonds 1992). This importance is identified for this zone from Oregon north through southeast Alaska, where large-scale

windthrow events are likely to occur several times each century. Generally, the same area is not affected by each storm. Local topography affects the pattern and severity of windthrow. On PALCO lands, wind-fallen trees are a common, but localized, occurrence. Windthrow in riparian leave strips or buffers occurs and is expected in the future but such windthrow is almost always limited to individual trees or groups of trees. Small-scale windthrow is windthrow which causes less impact than the complete blowdown of 200 feet, measured along the length of the stream, of trees within the riparian zone of Class I and Class II streams. This small-scale windthrow is a normal and expected part of the forest ecology and was contemplated when the mitigation measures for this Plan were designed. Small-scale windthrow is not expected to have a significant adverse impact on stream shading or water temperatures and will have the beneficial effect of introducing large woody debris into streams that currently lack this habitat forming element. Thus, small-scale windthrow does not pose so substantial an impact as to threaten an adverse change in the status of any covered species, and may actually benefit aquatic species (Lisle 1998, in press).

Windthrow Changed Circumstances

A windstorm which results in the complete blowdown of between 200 feet and 500 feet, measured along the length of the stream, of the trees within the riparian zone of any Class I or Class II stream is a Changed Circumstance.

In order to mitigate the impact of such changed circumstance windthrow on aquatic species, PALCO and the appropriate federal and state agencies will conduct an expedited watershed analysis on the hydrologic unit impacted by any changed circumstance windthrow.

The analysis will be commenced as soon as the requisite personnel from PALCO and the federal and state agencies required for the analysis can be made available. If a watershed analysis has been performed previously for such watershed, then the affected area will be revisited. If the watershed has not been previously analyzed as part of the contemplated watershed analysis process established by this Plan, then the watershed will be made a priority for analysis.

If multiple windthrow changed circumstances occur sufficiently close to each other in time such that the response will be significantly delayed due to lack of available personnel, PALCO will meet and confer with the applicable agencies in order to prioritize the analyses which need to be done. The purpose of prioritizing will be to consider those watersheds which are most at risk of further impacts first.

The outcome of the watershed analyses will be the development of appropriate measures to minimize to the extent practicable the occurrence of sediment inputs that could accumulate with the windthrow event and exacerbate negative impacts to the streams and aquatic covered species.

The measures developed will be implemented. Ongoing Covered Activities may continue to utilize the existing operating measures until the new measures resulting from the analysis are

developed. However, as the agencies deem necessary, in consultation with PALCO, measures will be promptly implemented to minimize adverse effects prior to completion of the watershed analysis to the extent feasible.

Windthrow Unforeseen Circumstances

A windstorm which results in the complete blowdown of more than 500 feet, measured along the length of the stream, of the trees within the riparian zone of any Class I or Class II stream is an Unforeseen Circumstance.

C. THE ROLE AND EFFECTS OF LANDSLIDES

Landslides are known to have local and often significant impacts on plant communities (e.g., Brown 1985). Depending upon their severity and scale, landslides can open up areas within otherwise continuous and closed forests for new reproduction. In addition, landslides are an important source of gravels and cobbles in streams. Evidence of landslides is observed more often in areas of high topographic relief with unstable surface soil profiles.

Within the area of the coast redwood forest of northern California, the effects of landslides in creating gaps for new reproduction are of greater significance than in other forest areas more subject to stand/forest replacing catastrophic events. Within the coast redwood forests, landslides are of relatively frequent occurrence, on the scale of decades. Landslides may have the potential to eliminate small patches of wildlife habitat, but these events are both impossible to predict and unlikely to have a cumulatively significant effect upon terrestrial species, given their wide distribution over the landscape and limited individual scale. By contrast, landslides, depending on their magnitude can have a significant negative effect on aquatic invertebrates and fish.

Accordingly, conservation and mitigation measures for aquatic species within this plan were designed both to address sediment and other habitat effects from past landslides and, through a comprehensive series of stream buffer prescriptions, land management restrictions, geologic surveys, and sediment monitoring, to avoid significant adverse impacts from management induced landslide and mass wasting events in the future. Landslides which causes significant alteration of the in-stream habitat condition to less than 10% of the total length of all Class I and Class II streams in any planning watershed are part of the ordinary ecology of the forest and are adequately addressed by the existing conservation and mitigation measures.

Landslide Changed Circumstances

A Landslide which causes, or is substantially likely to cause, significant alteration of the in-stream habitat condition to 10% or more of the total length of all Class I and Class II streams in

any planning watershed (see Map 2) is a Changed Circumstance, up to the level at which the landslide becomes an Unforeseeable Circumstance. (For example, if a particular planning watershed has 20 miles of Class I and Class II streams, then the Changed Circumstance will occur if the landslide causes, or is substantially likely to cause, significant alteration of the in-stream habitat condition of more than 2 miles of streams.)

In order to mitigate the impact of such changed circumstance landslide on aquatic species, PALCO and the appropriate federal and state agencies will conduct an expedited watershed analysis on the hydrologic unit impacted by any changed circumstance landslide.

The analysis will be commenced as soon as the requisite personnel from PALCO and the federal and state agencies required for the analysis can be made available. If a watershed analysis has been performed previously for such watershed, then the affected area will be revisited. If the watershed has not been previously analyzed as part of the contemplated watershed analysis process established by this Plan, then the watershed will be made a priority for analysis.

If multiple landslide changed circumstances occur sufficiently close to each other in time such that the response will be significantly delayed due to lack of available personnel, PALCO will meet and confer with the applicable agencies in order to prioritize the analyses which need to be done. The purpose of prioritizing will be to consider those watersheds which are most at risk of further impacts first.

The outcome of the watershed analyses will be the development of appropriate measures to minimize to the extent practicable the occurrence of sediment inputs that could accumulate with the landslide event and exacerbate negative impacts to the streams and aquatic covered species. The measures developed will be implemented. Ongoing Covered Activities may continue to utilize the existing operating measures until the new measures resulting from the analysis are developed. However, as the agencies deem necessary, in consultation with PALCO, measures will be promptly implemented to minimize adverse effects prior to completion of the watershed analysis to the extent feasible.

Landslide Unforeseen Circumstances

A landslide Unforeseen Circumstance shall be any slide which causes significant alteration of the in-stream habitat condition of 50% or more of the total length of all Class I and Class II streams in any planning watershed.

D. THE ROLE AND EFFECTS OF FLOODS

Although the impacts on forests from flooding are generally recognized (Brown 1985), the effects are apparently localized. Because most streams on PALCO's lands are partially or totally

contained (i.e., flow through narrow river valleys) the total area exposed to potential flooding is limited. The experience of observing large trees floating in flood stage rivers and the changing of river courses confirms that flooding does often remove, at least locally, trees or stands of trees. However, flooding is a natural and necessary component of stream ecosystems. For example, floods transport and sort sediment, carry fine sediments and nutrient onto flood plains, clean spawning substrates of silts and sands, and produce scour that leads to the development of pools and other habitat. Changing river courses also periodically provides opportunities for the establishment of new stands of trees within the coastal areas of California, Oregon, and Washington.

Within the Coastal Redwood Zone of northern California, flooding is important for providing opportunities for the establishment of new Redwood stands (Franklin and Dymess 1973). The rich alluvial terraces along river courses provide ideal growing conditions for coast redwoods, evident in the high quality old-growth stands present in many river-bottom areas. Although many such stands persist for hundreds of years, all are subject to partial or complete elimination during major flood events. In fact, rather than a concern for elimination of habitat values, these processes are seen as habitat *enhancing* for many species -- i.e., the recruitment of large woody debris into riverine systems for salmonid habitat structure and improved watercourse morphology, etc. The aquatics component of the HCP recognizes the dynamic nature of stream courses and already accounts for effects of flood by, for example, significantly restricting harvest adjacent to Class I and II streams and thus allowing for natural processes to mitigate the effects of flooding. A central component of the aquatics strategy is a watershed assessment process which will result in watershed-by-watershed prescriptions on activities adjacent to stream courses and reflecting the specific geomorphology of each watershed. Thus, the watershed assessment will result in specific prescriptions in those watersheds. For example, watershed analysis will identify road segments and hill slopes at high probability of delivering sediment to streams, and will identify management mitigations to address these problems.

Floods which are less in magnitude than a 50-year recurrence interval event (i.e., less than a 50-year flood) are part of the expected normal ecology of the forest. The mitigation and conservation measures in the Plan, as described in this paragraph, are adequate mitigation for such floods.

Flood Changed Circumstances

50-year to 100-year recurrence interval event floods are the floods which constitute a changed circumstance.

Like for the impacts of the other changed circumstances, in order to mitigate the impact of such changed circumstance flood on aquatic species, PALCO and the appropriate federal and state agencies will conduct an expedited watershed analysis on the hydrologic unit impacted by any changed circumstance flood.

The analysis will be commenced as soon as the requisite personnel from PALCO and the federal and state agencies required for the analysis can be made available. If a watershed analysis has been performed previously for such watershed, then the affected area will be revisited. If the watershed has not been previously analyzed as part of the contemplated watershed analysis process established by this Plan, then the watershed will be made a priority for analysis.

If multiple flood changed circumstances occur sufficiently close to each other in time such that the response will be significantly delayed due to lack of available personnel, PALCO will meet and confer with the applicable agencies in order to prioritize the analyses which need to be done. The purpose of prioritizing will be to consider those watersheds which are most at risk of further impacts first.

The outcome of the watershed analyses will be the development of appropriate measures to minimize to the extent practicable the occurrence of sediment inputs that could accumulate with the flood event and exacerbate negative impacts to the streams and aquatic covered species. The measures developed will be implemented. Ongoing Covered Activities may continue to utilize the existing operating measures until the new measures resulting from the analysis are developed. However, as the agencies deem necessary, in consultation with PALCO, measures will be promptly implemented to minimize adverse effects prior to completion of the watershed analysis to the extent feasible.

Flood Unforeseen Circumstances

A flood which is greater in magnitude than a 100-year recurrence interval flood event is an unforeseen circumstance.

E. THE ROLE AND EFFECTS OF EARTHQUAKE

The region in which PALCO's lands are located lies in an area known for frequent, but generally small, earthquakes. The San Andreas fault passes within 50 miles offshore of most of the Company's lands, and several smaller, less-significant faults are found throughout the region. Because earthquakes are quite common, they are generally of a relatively insignificant magnitude, on average of approximately Richter scale magnitude 2. Occasionally, more significant events occur, but of course, they are impossible to predict. For example, in April of 1992 three earthquakes of magnitude 6 or greater on the Richter scale occurred in relatively short succession. These earthquakes produced ground shaking of sufficient magnitude to sever a gas line, resulting in a fire which destroyed the Scotia Shopping Center near PALCO's headquarters and offices. However, in the forest environment, even these earthquakes -- perhaps the most significant clustered events in recorded history -- produced little if any visible change, and apparently no significant impact to wildlife or fishery habitat. No stand of trees of any age is

known to have been downed as a result of the April 1992 earthquake, or any other recorded earthquake event. While, it may be speculated that localized landslides or other earth movements resulted from the earthquake, there is no data to document that this occurred on PL's lands.

Earthquake-caused landslides, if any, would occur in areas of high topographic relief and with unstable surface soil profiles. These areas are already mapped, and are subject to numerous mitigations, other management measures and restrictions as provided in this plan to prevent or minimize their occurrence, and if they do occur, to minimize their impact. While the connection has never been made on PALCO lands, it is also possible that some trees have fallen as a result of earthquake activity. Fallen trees located in the forest are generally attributed to windthrow effects, and in the aggregate, from whatever cause, fallen trees are not of so significant a number or volume as to require additional mitigations and/or changes in the management scenario or restrictions outlined in this plan.

Landslides caused by earthquakes will be addressed pursuant to the "Landslide" subsection of this Changed Circumstances section. Earthquakes of such significant magnitude as may substantially alter habitat status or require additional conservation or mitigation measures other than responding to landslides caused by such earthquake are not reasonably foreseeable during the life of the HCP.

F. THE ROLE AND EFFECTS OF EL NINO AND OIL SPILLS

The murrelet, one of the focus species of this Plan, is a seabird. The coho salmon, chinook salmon, and other fish species covered by this Plan are anadromous. Obviously the conditions at sea, where these species spends much of their lives, are of importance in any evaluation of potential habitat changes. The ocean offshore of the Company timberlands serves, as well, as habitat for many invertebrates and fish which may be prey sources for murrelets and raptors or are otherwise covered under the Plan. Humboldt Bay National Wildlife Refuge was established in 1989 in recognition of the area's unique fish and wildlife values.

The risk of an oil spill incident in the area is probably greatest in developed ports. For example, Humboldt Bay has been identified as a "facility transfer area" by the CDFG division of Oil Spill Prevention and Response. (Statewide Coastal Protection Review, report to Calif. Legislature 1995 .) Millions of gallons of fuel are delivered into Humboldt Bay annually in as many as 60 deliveries each year. (*Id.*)

Nonetheless, despite the potential risk for large oil spills, historically, most spills have been small. The average spill volume has been calculated to be 77 gallons, or 1.8 bbls. In one study by DFG, most spills were reported to be in the 5 to 25 gallon range during the period from 1984 through 1991, the last period for which figures could be obtained. (*Id.*)

While such events may be reasonably foreseeable -- inasmuch as over the same 7-year period as

many as 150 spill incidents of some sort were documented -- most such events were not of the sort which would result in substantial adverse change, or indeed in any measurable change, in the status of the species covered under this plan. One significant spill in Humboldt Bay in November 1997 is thought to have killed 11 murrelets, but this effect does not argue for additional timberland mitigation provisions, for example, where adult birds' reproductive habitat availability could be considered proportionally increased by such mortality effects: fewer birds in an area, from effects other than habitat limitations, translates to greater nesting opportunities for remaining adults. No additional changes to the mitigation or conservation measures in this Plan are required to respond to oil spills. An oil spill of sufficient magnitude to cause so significant adverse impacts to the murrelet or any other covered species that additional conservation or mitigation measures are required is an unforeseen circumstance.

El Nino, the warm water current that flows across the South Pacific and causes temperature and rainfall changes throughout the Pacific Northwest is a Changed Circumstance. However, the Plan was developed during an El Nino event. Thus this Plan contains all mitigation necessary to respond to another El Nino event of the same magnitude as occurred in 1997-1998. An El Nino event of greater magnitude than occurred in 1997-1998 is an unforeseen circumstance.

III. LEGAL CHANGED CIRCUMSTANCES AND UNFORESEEN CIRCUMSTANCES

A. NEW LISTING OF SPECIES NOT COVERED UNDER FEDERAL OR STATE PERMIT

The preamble to the No Surprises rule states that the listing of a species as endangered or threatened may constitute a changed circumstance.

The Wildlife Agencies shall immediately notify PALCO upon becoming aware that a species which is associated with habitat found on the Covered Lands and which is not a Covered Species (a "Uncovered Species") may be or has been proposed for listing.

Upon receipt of notice of the potential listing of an Uncovered Species, PALCO may, but is not required, to enter into negotiations with the Wildlife Agencies regarding necessary modifications, if any, to the Plan required to amend the applicable Federal Permit and/or State Permit to cover the Uncovered Species. If PALCO elects to pursue amendment of the applicable Permit, the Wildlife Agencies will provide technical assistance to PALCO in identifying any modifications to the Plan that may be necessary to amend the applicable Federal Permit or State Permit.

In determining whether any further conservation or mitigation measures are required in order to amend the affected Permit to authorize Incidental Take of such Uncovered Species, the Agencies

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shall take into account the conservation and mitigation measures already provided in the Plan and cooperate with PALCO to minimize the adverse effects of the listing of such Uncovered Species on the Covered Activities consistent with Section 10 of the FESA or CESA, as required by section 6.1.5(b) of the Implementation Agreement.

Once a “may be warranted” finding is made by the applicable Service or the Fish and Game Commission, the applicable Wildlife Agency shall use its best efforts to identify any necessary measures to avoid the likelihood of jeopardy to or take of (the “no take/no jeopardy measures”) the Uncovered Species. The measures shall be developed in consultation with PALCO.

If PALCO and the applicable Wildlife Agency cannot come to agreement on the “no take/no jeopardy” measures, PALCO may invoke the alternative dispute resolution process set forth in section 9.2 of the Implementation Agreement.

If the applicable Federal and/or State Permit has not been amended to include the Uncovered Species at the time the species is listed, then PALCO shall implement the “no take/no jeopardy” measures identified by the Agencies until the applicable Permit is amended to include the Uncovered Species or the Wildlife Agencies notify PALCO that such measures are no longer needed to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat, if any, of the Uncovered Species.

B. Changed Circumstances To Address Suspension, Revocation or Relinquishment of Either the NMFS or USFWS Federal Permit.

If either the USFWS or the NMFS Federal Permit is suspended, revoked or relinquished in accordance with the procedures in the Implementation Agreement, the Wildlife Agencies will re-evaluate the remaining Federal Permit to insure that continuation of one or more of the Covered Activities is not likely to jeopardize, take, or adversely modify the critical habitat, if any, of the Covered Species listed under the FESA and included on the suspended, revoked or relinquished permit (the “Affected Covered Species”). The applicable Wildlife Agencies will identify any modifications to the Covered Activities in consultation with PALCO necessary to avoid Take and/or jeopardy to the Affected Covered Species. If PALCO disagrees with the modifications to Covered Activities identified by the Wildlife Agencies, PALCO may invoke the dispute resolution process provided under Section 9.2 of the Implementation Agreement without waiving its right to seek judicial review of any applicable agency decision. PALCO shall implement any identified modifications to the Covered Activities until USFWS or NMFS notifies PALCO in writing that modifications to the Plan Covered Activities are no longer required to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat, if any, of the Affected Covered Species, the suspended Federal Permit is reinstated, or PALCO applies for and is issued a new FESA section 1 O(a)(1)(B) permit covering the Affected Covered

Species. Any modification required by the Wildlife Agencies shall to the maximum extent feasible minimize impacts to Covered Activities consistent with this Plan and the Implementation Agreement.

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